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ENTOMOLOGICAL NEWS

VOL. LX JULY, 1949 No. 7

Additional Data Upon the Fleas of the Sagebrush Vole

By C. ANDRESEN HUBBARD, Vanport College, Portland, Oregon

Since publishing last month (Ent. News, June 1949, pp. 141–144) on the fleas of the Sagebrush Vole in the State of Washington, the writer has been fortunate in having Dr. C. W. Clanton of the Washington State Board of Health send him several new batches of fleas from west of the Columbia River, whereas previous parcels had been taken east of the River, and through his own efforts in the field in the vicinity where Oregon, California and Nevada meet he collected from this mouse in all three states. The writer's voles (*Lagurus curatatus*) were taken in live traps baited with apple and oatmeal in gullies that had had streams in their bottoms earlier in the year. The gullies were in sagebrush plains. The voles were taken in the ratio of about 1 to 4 with the meadow mouse *Microtus montanus* and on the latter's runs. This new study, then, gives a picture of the fleas of Lagurus from Washington, Oregon, California and Nevada.

Throughout their range these desert meadow mice carry a Thrassis of their own which the writer described in last month's article as *Thrassis gladiolis johnsoni.* The writer can now report this flea off *Lagurus curatatus pauperrimus* (State of Washington Sagebrush Vole) on both the east and west side of the Columbia River which cuts the range of the mouse in two in the State of Washington. The records are from Davenport, Lincoln County, Washington, April, May and June, a large series. This is east of the Columbia River. And from Ellensburg, Kitittas County, Washington, during June and early July

a good series from west of the River. And off *Lagurus curatatus intermedius* (Intermediate Sagebrush Vole), 14 miles north of Fort Bidwell, Modoc County, California, 2 males, 3 females; 13 miles south Adel, Lake County, Oregon, 1 male, 2 females; 49 Ranch, 4 miles west Vya, Washoe County, Nevada, 5 pair.

These data answer the question raised by the writer last month of how a *Thrassis gladiolis* could appear in Washington. Lagurus has carried it from south to north, in the south the range of the mouse being in the same dry sagebrush plains as *Citellus leucurus,* the Antelope Ground Squirrel, which is the true host of the flea *Thrassis gladiolis gladiolis* in southern Oregon, Nevada and California.

The writer has found no variation in *Thrassis gladiolis johnsoni* in the range of the Sagebrush Vole.

A flea of the genus Megabothris carried by these mice shows considerable variation, however. Several hundred specimens delivered to the writer by Dr. Clanton from east of the Columbia River in Washington showed no great variation. These the writer described last month as *Megabothris clantoni.* The writer finds that the related flea from *Lagurus c. intermedius* is different and new and shall be called:

Megabothris princei, a new species

There are before the writer at this time the holotype male and allotype female and a short series of paratypes. The new flea lies between *Megabothris abantis* and *M. clantoni.*

Male: Process of clasper as in *abantis* and *clantoni.* Finger with general shape of *clantoni* but with portion above shank rectangular rather than constricted apically as in *clantoni.* Armature as in *abantis,* i.e., 3 spiniforms on posterior border, two short, plump ones above, long pointed one below; the lower shorter one closer to the long one. VIII sternite in male similar to *clantoni* but armature consists of more stout curved bristles at apex and a constriction on lower border at about mid point.

Female: Apical outline of VII sternite not easily separated from *abantis* and *clantoni,* consisting in the allotype of a single

rounded upper lobe, the armature of 8 major bristles and a lesser number of minor ones to the anterior. Spermatheca characteristic for the abantis-clantoni series but in type finger-like appendix is flattened apically toward body.

The male of the new flea is 2.75 mm. long, the female 2.25 mm. The type locality is the draw behind the 49 Ranch house (deserted) 4 miles west of Vya, Washoe County, NEVADA. The type host is *Lagurus curatatus intermedius* (Taylor). The *types,* mounted on separate slides, bearing the writer's number 2712 are deposited in the National Museum. *Paratypes* are deposited in British Museum, Canadian National Museum, Academy of Natural Sciences of Philadelphia and California Academy of Science. This flea bears the name of Frank Prince, Entomologist at Plague Suppressive Measures Laboratory, San Francisco, California.

Records: Off *Lagurus curatatus intermedius* (Taylor), 49 Ranch, 4 miles west Vya, Washoe County, Nevada. Types and 3 males and 5 females; 14 miles north Fort Bidwell, Modoc County, CALIFORNIA, 2 males, 1 female; 13 miles south Adel, Lake County, Oregon, 1 male, 2 females.

Off *Microtus montanus micropus* Hall, 49 Ranch, Vya, Nevada, a male.

During mid-summer Dr. Clanton changed his field of operations from east of the Columbia River in central Washington to west of the River. When the writer examined the fleas sent him off Lagurus from west of the River no variation was found in *Thrassis gladiolis johnsoni* but the Megabothris was different from the form east of the River. The new variation shall be called:

Megabothris clantoni johnsoni, a new subspecies

There are before the writer at this time the holotype male, the allotype female and 5 pairs of paratypes. In the new subspecies the finger is like *clantoni* but the VIII sternite is like *princei* and, since siphonapterists have given more weight to the finger than the VIII sternite in taxonomic studies, *johnsoni* is closest to *clantoni.*

Male: Finger ham shaped as in both *clantoni* and *princei* but, as in *clantoni,* constricted at the apex. Armature as in *clantoni,* on posterior border below the characteristic long pointed spiniform, above it a short plump spiniform and at apical angle a short stout bristle, which in a small percentage of cases is spiniform. The VIII sternite is princei-like in that apically it is armed with a series of curved long bristles followed proximally by a series of short ones.

Female: VII sternite as in the clantoni-princei-abantis series, with rounded upper lobe in allotype, the armature consisting of about 7 major bristles, 4 medium ones and as many small ones. Spermatheca typical for the group.

This flea is smaller than *clantoni* and *princei* measuring only about 2.00 mm. in both sexes. The type locality is 18 miles east of Ellensburg, Kitittas County, WASHINGTON where Dr. Clanton took the fleas off *Lagurus curatatus pauperrimus,* the type host. The *holotype* male and *allotype* female are mounted on one slide bearing the writer's number 2759 and deposited in the National Museum; *paratypes* distributed as for *M. princei.* This flea bears the name of Dr. Murray Johnson, Surgeon, of Tacoma, Washington, one of the leading naturalists of the State.

From this report it seems likely that the Columbia River is the dividing line between the range of *M. c. clantoni* to the east and *M. c. johnsoni* to the west.

OTHER FLEAS FROM LAGURUS

Two interesting records from Dr. Clanton's material from west of the Columbia River are from one vial of fleas off Lagurus: 48 males, 90 females of *Meringis shannoni* (Pocket Mouse flea) with only 5 pairs of *Thrassis gladiolis johnsoni* and 1 male *Megabothris clantoni johnsoni.* A second vial contained 6 pairs *Megabothris c. johnsoni,* 10 pairs *Thrassis g. johnsoni,* a pair *Catallagia decipiens,* 1 male *Meringis shannoni.* The writer took off *Lagurus c. intermedius* besides *Thrassis g. johnsoni* and *Megabothris princei, Malaraeus telchinum* and *Catallagia decipiens.*

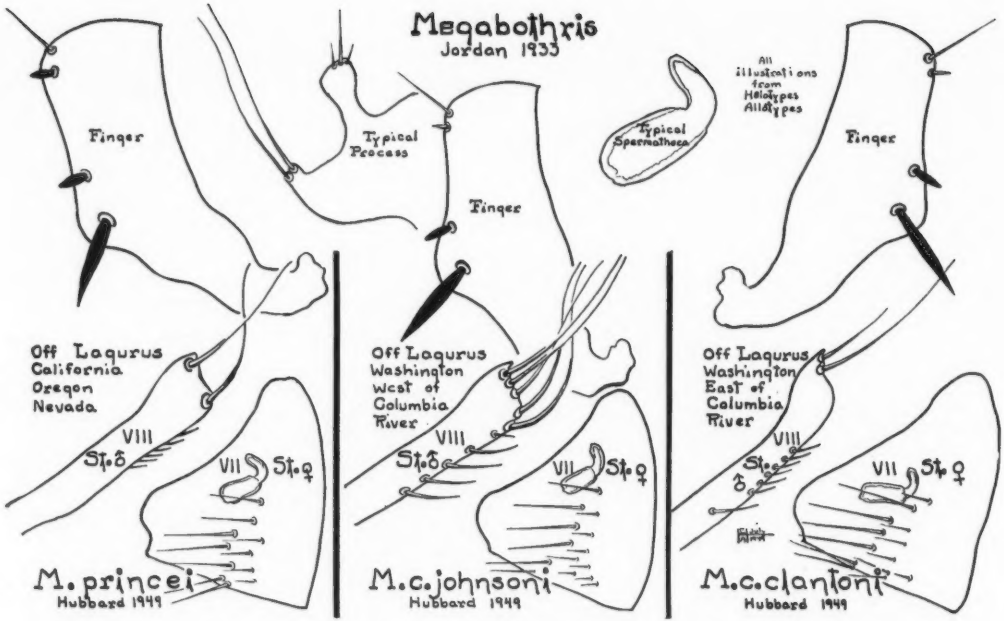

FIG. 1. *Megabothris princei, M. clantoni johnsoni, M. c. clantoni.*

In closing this article the writer wishes to say that the voles taken by him were brought back to the laboratory alive. It is now 2 P.M. and they have just ventured out of their nests for afternoon feed and exercise. The mice are gray, lacking the red found on the back of Microtus and their tails are very short, less than an inch in the mature mouse. As they feed, they go first to the apple. Apple then should be used as bait in live traps. Lagurus rises early for breakfast and at this time, coming from their warm nests, they carry many fleas. They soon dust them off, however, and catches later in the day bring the collector few fleas. Fleas from Lagurus in Washington have been found plague positive but it is not known as yet which of the Laguran fleas are vectors, although *Malaraeus telchinum* has definitely been condemned as a vector. Because of the plague angle, Lagurus and its fleas should be handled with some caution.

A Minute on Podium Luctuosum (Hymenoptera: Sphecidae)

Ever since Frederick Smith described *Podium luctuosum* from North Carolina in 1856, this wasp has been a rather rare species. Kohl reported it from Texas in 1902, and in recent years a few specimens have been taken at or in the vicinity of Washington, D. C. A specimen of *Podium luctuosum* was taken July, 1948 in a sand pit adjacent to Six Mile Creek, Ithaca, N. Y. This represents the northernmost record for the species up to the present. The specimen captured was a female carrying its prey, a female cockroach, *Parcoblatta virginica* (Brunner) [det. James A. G. Rehn]. Nothing has hitherto been known about the biology of *luctuosum*, although Rau presented a short but interesting account of the other Nearctic species, *P. biguttatum*.—V. S. L. Pate, Cornell University, Ithaca, N. Y.

Notes on the Mating Behavior and Oviposition of Creophilus maxillosus (Linné)

By George S. Fichter, Department of Zoology, Miami University, Oxford, Ohio

Creophilus maxillosus is conspicuously larger than the majority of beetles found around carrion. It can be distinguished easily from other beetles approximating its size by its Staphylinid characteristic of abbreviated elytra. No other Staphylinids of comparable size are found in such a habitat. Excluding the areas of whitish-yellow setae described below, the coloration of the beetles is entirely black.

Since *Creophilus maxillosus* is attracted to carrion, small vertebrate carcasses were employed as lures. These were placed at various locations in the field and examined regularly in order to collect the beetles attracted there. Many different animals (fish, frogs, turtles, snakes, lizards, birds, mice, rats, cats, and rabbits) were utilized in the course of the experiment. All served equally well as lures for the beetles. Rats were used most commonly.

The carcasses were generally placed directly on the surface of the ground. No attempt was made to trap the beetles at the carrion since the carcasses were examined frequently and the presence of an adequate food supply was sufficient to cause the beetles to linger. In addition, placing the carrion in containers and sinking the containers into the ground so that their brims are flush with the surface, which is the normal procedure for trapping, reduces its accessibility. When the carrion is completely exposed, there is nothing to hinder the natural dissemination of its odor and, hence, its discovery is facilitated.

Mating Behavior

In the laboratory the adult beetles were kept in a glass terrarium (35 × 15 × 12 centimeters) in which the dirt level was maintained at four to five centimeters. The beetles copulated readily under laboratory conditions, and the act was also ob-

served on numerous occasions in the field. The following is a composite description of the observations noted.

When two beetles approached each other for the first time, they brought their antennae and mouth parts into contact momentarily, brushing them against each other rapidly. They generally followed this by examining the tips of their abdomens with their antennae. These preliminary activities apparently were a means of sex identification. For if the two beetles were of the same sex, they snapped viciously at one another with their mandibles, disengaged themselves after a temporary struggle, and separated hurriedly. On the other hand, if the two beetles were of opposite sexes, the male would immediately attempt to crawl astride the female. Frequently the female resisted such advances either by elevating the tip of her abdomen so that the male could not mount her or by running away rapidly. In either case the male at first persisted in its attempts. If the female ran, the male usually followed in close pursuit and sometimes succeeded in overtaking her. When the male's endeavors were continually rejected, the copulation attempt was finally abandoned.

When successful in mounting the female in the usual manner —crawling astride from the rear—the male bent the tip of its abdomen down to contact the slightly upturned tip of the female's abdomen and at the same time exserted its genitalia. At the insertion of the genitalia the male was astride the female. Its prothoracic legs were rested on the humeral angles of the female's elytra and were supported on their transversely expanded tarsites. The terminal tarsites, bearing the strongly curved claws, were protruded at the sides of the elytra and not employed in any manner of support. The mesothoracic legs were either rested on the edge of the abdominal segments or extended to the ground. Likewise, the metathoracic legs were stretched down at the sides of the female to rest on the ground.

This position of embrace characteristic of the initial stages of coitus was never maintained over a long period of time. Sometimes the female kept in continuous movement, and the union was accomplished as the beetles ran along, with the male jostled up and down in its awkward, insecure position. In most cases,

however, the female remained motionless during the insertion of the genitalia but moved off after the elapse of a few seconds. Since the male had no firm clasp on the female with its tarsal claws and was attached to her only by its genitalia, the female glided from beneath the male easily in such cases, and the male became oriented so that it faced in the opposite direction to the female. The two remained united only by their genitalia. Unless the specimens were of similar size, the larger of the two usually crawled off, dragging its companion behind it. The smaller of the two seldom resisted or attempted to oppose the direction chosen by its mate. Both sexes were observed attacking and consuming maggots in many instances during coitus.

Sometimes a second male attempted to copulate with a female already engaged. In such cases the two males snapped viciously at one another. An interference of that sort often resulted in the disengagement of the copulating pair. Then the stronger of the two males would engage the female again unless she managed to escape completely. The males were totally indifferent to one another in her absence.

In the specimens confined to cages, the act of coitus was attempted almost every time a male chanced to encounter a female, even though it was the same one with which the act had just been completed. The sexual impulse of the male was apparently stimulated at the slightest contact with a female. The duration of the act was brief, and the beetles normally disengaged themselves within three to five minutes.

Oviposition

Eggs were deposited singly both above and below the surface of the ground. The dirt level was maintained at approximately five centimeters in the cages, and eggs were frequently found on the bottom as well as at various levels up to and on the surface. Likewise, eggs were found on the surface, beneath the carrion, and at various levels below the surface in the field. It seems likely from such discoveries that the beetles do not select particular depths of situations in which to place their eggs but are indiscriminate.

Although oviposition below the surface of the ground was never observed, it was seen on several occasions at the surface level. The female made no elaborate preparation of the substratum to form a slit or cavity of any sort for the reception of the egg. She merely applied the tip of her abdomen to the surface and at the same time generally elevated the anterior portion of her body slightly by stiffening the fore and middle legs. The rigid condition of the abdomen frequently pushed its tip into the soil and produced a slight depression, but this seemed wholly dependent on the nature of the soil. The entire act required little more than a minute if the female were left undisturbed. Immediately after the egg was deposited, the female crawled away without examining the egg or attempting to conceal it.

In several instances females in the process of ovipositing were accosted by males which attempted copulation. If the female had actually begun discharging the egg from her abdomen, such an interruption seemed to accelerate her activity. On the other hand, if she had just assumed her position, she tried to ward the male off in the usual fashion by fighting or running away hurriedly. In the latter instances the act was usually completed in a more secluded section of the cage.

Despite the apparent haphazard placement of the eggs, it should be noted that they are, nevertheless, advantageously located. The congregation of adult beetles about carrion brings together large numbers of males and females, and the association naturally results in mating and oviposition at that site. Eggs deposited in such surroundings are incubated by the heat of the decay, and the newly emerged larvae have little distance to travel in locating supply of food.

Eusattus vs. Sphaeriontis

By Ira La Rivers, University of Nevada, Reno

In 1908, Col. T. L. Casey described the genus *Sphaeriontis* to include "five known species," which he arranged in a key: *S. muricata* (Le Conte) 1852, *S. dilatata* (Le Conte) 1852, *S. acomana* n. sp., *S. ciliata* (Horn) 1894 and *S. puberula* (Le Conte) 1854. He further emphasized that *S. dilitata* could not be considered a synonym of *S. muricata,* as Horn had indicated as early as his 1870 monograph on the family.

Having had occasion to go over *Eusattus* and *Sphaeriontis* somewhat completely in the recent past, it became rather obvious that the group as defined by Casey was more finely drawn than the actual specimens themselves warranted. My conclusions are that *Sphaeriontis* is a weak subgenus of *Eusattus,* and perfect intergradation between *Eusattus muricatus* and *E. dilatatus* in my series indicates that Horn was correct in synonymizing the latter with the former.

Casey makes mention of the "densely punctulate epipleurae and more or less confluent granules of the elytra" as "amply distinguishing it" (*dilatatus*) "from *muricata,* aside from its radically different habitat." The morphologic structures he calls attention to are those which Horn long ago fully demonstrated to be too weak and intergrading to be of value, and it is difficult to see why Casey resurrected them. As for their being "radically different" in habitat, my experience has shown that the two occur in identical situations, on sand dunes or in sanded areas; perhaps Casey's biologic information was based on second-hand data from others or gleaned from collecting one or a few anomalous individuals "out of character."

Another possible source of error may have been the fact that Casey based some of his conclusions as to relationships within the group solely on published descriptions not having seen, at the time of his paper, specimens of *E. dilatatus, E. puberulus* or *E. ciliatus.* In addition, the three species Casey added to the genus are quite patently synonyms of *Eusattus muricatus,* my conclusions being based on specimens from his type locality.

The synonymy should be indicated as

Eusattus Le Conte 1852
(*Sphaeriontis* Casey 1908)
muricatus Le Conte 1852
(*dilatatus* Le Conte 1852)
(*acomana* Casey 1908)
(*latissima* (Casey) 1924)
(*fulvescens* (Casey) 1924)
ciliatus Horn 1894
puberulus Le Conte 1854

I have previously made passing mention of *Sphaeriontis* as a subgenus of *Eusattus* (1948: 709).

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La Rivers, I. 1948. A synopsis of Nevada Orthoptera. Amer. Midl. Nat., 39: 652–720.

Records of the Order Zoraptera from Alabama

By B. D. Valentine and E. O. Wilson, University of Alabama

A B. Guerney (*Proc. Ent. Soc. Wash.*, 40: 3, 1938), in his synopsis of the order Zoraptera, estimated the range of *Zorotypus hubbardi* Caudell to be from Maryland to Texas. Although he included no records from Georgia, Alabama, and Mississippi, Guerney stated that the insect is probably abundant in all of the southern states. Recent collections from Alabama have been numerous enough to indicate that this is true at least in this state. Typical *Z. hubbardi* was collected from March 30 through April 28, 1949, in the following widely distributed localities: Millport, Lamar Co.; Gordo, Pickens Co.; Alberta City, Peterson, and Lynn Haven, Tuscaloosa Co.; Eutaw, Greene Co.; Alabama Port, Mobile Co.; Bear Point, near Orange Beach, Baldwin Co.; and Chattahoochee State Park, Houston

Co. Specimens were identified principally on the basis of genitalic slides compared with Guerney's figures. In seven of the localities, the insects were found under thick bark of moist pine stumps and logs. At Eutaw, they occurred under the bark of thoroughly dry pine stumps; and at Peterson, they were under the bark of a moist oak log. Many insects, particularly termites of the genus *Reticulitermes* and ants of the genus *Proceratium,* were frequently observed in the same situation as *Zorotypus,* but no evidence was found to indicate an obligatory association. In a total of 151 individuals taken, there were 59 apterous males, 45 apterous females, 3 dealate females, and 44 nymphs. No alate-form males were collected. Individual collections varied from a single apterous female to a group consisting of 21 apterous males, 18 apterous females, and 10 nymphs.

Notes on Gesomyrmex (Hymenoptera: Formicidae)

After my manuscript on *Gesomyrmex* (Amer. Ent. Soc. Amer. XLII (1949) : 71–76) went into proof, I received a communication from Dr. James Chapman, Silliman University, Dumaguete, Philippines, together with workers from two nests of *G. luzonensis* var. *chapmani* Wheeler. I feel that some of the data extracted from the letter are well worth noting in print.

When Dr. Chapman returned to Dumaguete about two years ago he began looking for colonies of *Gesomyrmex*. A tree in which he had previously located several nests had been destroyed by fire when the Japanese burned his mountain house. Dr. Chapman looked for nearly two years before he found another colony. He had to climb trees, search for workers among the higher foliage, and then follow the ants back to their burrows in the branches. The nests are only in the living branches.

Dr. Chapman states that he has taken *Gesomyrmex* on three different islands of the Philippines group and that the ants seem at least superficially to belong to the same species.

A. C. Cole,
Department of Zoology and Entomology,
University of Tennessee, Knoxville

Night Collections of Dragonflies (Odonata: Anisoptera)

By George H. Bick, Zoology Department, Tulane University, New Orleans

My attention was called to the possibility of obtaining large numbers of dragonflies at night by Mr. J. Bolley and Mr. C. Chaney who observed many of them perched on weeds and shrubs and apparently sleeping in a weedy field just outside the city limits of New Orleans. On the night of May 4 Mr. Bolley and I collected *Libellula needhami* (9 males, 11 females) and *Pachidiplax longipennis* (1 male, 2 females) in about one and one-half hours using a flashlight only. Most of the dragonflies were taken about 18 inches above ground perched on the basal dry parts of *Paspalum* sp. On the night of May 24 at the same locality and in about the same period of time Dr. Penn and I collected *L. needhami* (11 males, 7 females), *Anax junius* (1 male), *P. longipennis* (1 female). These were taken along a road bordering the field and were mostly from *Ambrosia* sp., *Verbena bonariensis,* and *Salix nigra* at heights of about three feet.

On both occasions the dragonflies were perched vertically and were apparently sleeping. They were taken in the beam of light with the fingers. Often they scarcely stirred even after capture.

The ease in collecting these specimens as contrasted with the more tedious daytime net technique warrants calling it to the attention of other workers. The method seems to have possibilities to furnish basic data for population analyses.

D.D.T. as a Contributing Factor to the Increase of Trematode Diseases in Man and Other Animals.

Under the title "Does destruction of water insects cause increase of Trematode disease?" Mr. J. Omer-Cooper has an article in the Entomologist's Monthly Magazine, of London, for June, 1949, in which he states:

"In the Hluhlwe game reserve [Zululand] . . . there is a stream—a mere trickle of water at the time we visited it—with many pools in its bed, some of which are large and inhabited by fine specimens of crocodile. These crocodile pools and indeed all the pools in the game reserve have been sprayed by aeroplane many times with D.D.T. The waters had a curious dull dead look. Careful collecting showed that the D.D.T. had done its work well; not so much as a mayfly or dragonfly nymph was caught. There were no beetles, but the stones were dotted everywhere with surprisingly large numbers of aquatic mollusca. On the road to Mkuzi there was a fine pond with lily pads over which ran . . . jacanas . . . while dragonflies darted here and there over its surface. Here was a plentiful supply of both dragonfly and mayfly nymphs. Beetles were present in numbers that made glad the heart. Molluscs were not particularly plentiful."

Other examples of absence and of presence of dragonflies and their nymphs in Zululand and in the Northern Transvaal are given. Where enemies of molluscs, e. g., birds, certain insects, are destroyed, molluscs are numerous. "An increase in molluscs is likely to be accompanied by an increase in those Trematodes which spend the early part of their lives within their bodies. Many of these trematodes are parasites of the Mammalia. Man and his domestic animals suffer from their attacks. When water snails increase there should be a greater incidence of Trematode disease. In Zululand and in the Transvaal, Bilharziasis is very prevalent and seems to be definitely increasing."

We specify D.D.T. in this concatenation to render Mr. Omer-Cooper's examples the more eligible to inclusion in that series of classics which embraces Darwin's famous case of old maids (a post-Darwinian addition, to be sure), cats, mice, humble bees and red clover, and, still older, The house that Jack built.

PHILIP P. CALVERT.

Current Entomological Literature

COMPILED BY RAYMOND Q. BLISS AND R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1949 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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Reviews

A GENERAL TEXTBOOK OF ENTOMOLOGY, by A. D. Imms. Seventh edition. New York, E. P. Dutton and Co., Inc. Pp. xii, 727, 624 figs., $12.50.

Reviews of earlier editions of this great textbook have appeared in ENTOMOLOGICAL NEWS for 1925 and 1934. Published by Methuen and Co., Ltd., London, it is handled in this country by E. P. Dutton and Co. who have placed it on sale as of May tenth. Its author, the well known chief of the Rothamstead Experimental Station, died on April third.

The jacket of the book states that this is a "revised" edition, a statement that is rather misleading since the book has by no means been brought up to date and does not differ essentially from the third edition which appeared in 1934. A few unimportant illustrations have been replaced since then and two or three new references have been added to the literature.

In spite of the fact that some parts of the book are not up to date, this text is still very valuable and useful, even in America. The section on classification is very extensive and thorough and under each order there is included an account of the internal anatomy of that order, something that one cannot find in American general textbooks. The information on external features, taxonomy and biology is similar to that in our own Comstock and about as detailed, while the keys are less formidable and discouraging since they are broken up into separate keys to the superfamilies. Finally, another useful feature of Imms has been the carefully selected list of references at the end of each chapter.—R. G. SCHMIEDER.

THE FIG, by Ira J. Condit. Pp. xviii + 222, 27 text figures. Waltham, Mass., 1947, the Chronica Botanica Co.; New York City, Stechert-Hafner, Inc. Price $5.00.

This volume is sufficiently comprehensive in its treatment to be valuable alike to the historian, the fig culturist, the botanist and the entomologist. The author has traced the history of the fig in great detail as the most ancient of known cultivated fruits, from about 2000 B.C., to its first introduction into America in about 1575, and on to its high development in the modern fruit industry.

In addition, he discusses the systematic botany, breeding, caprification, varieties and character of the fruit, fig culture, propagation, dried figs, chemistry and food value, marketing, disease and pests. The work is of interest to the entomologist not only from the standpoint of insects which attack the fig, but also for their unique and necessary use in its fertilization. The book is most thoroughly documented and contains a comprehensive bibliography of about 750 titles.—M. E. PHILLIPS.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Lepidoptera—Large quantities of Plexippus, Colias, Cardui, Vanillae wanted for cash or exchange for tropical butterflies. G. MacBean, 710 Miller Rd., Sea Island, Vancouver, B. C.

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